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NOMADA FLAVA PANZER AND THE STRAINS OF *N. PANZERI* LEPELETIER (HYMENOPTERA, APIDAE)

By O. W. Richards, M.A., D.Sc., F.R.E.S.

The purpose of the present paper is to separate the above closely allied species from one another and from the extreme variants of certain other species and to show how the forms of *N. panzeri* attached to different species of *Andrena* are differentiated and may have been evolved. A longer manuscript, giving fuller biometrical data, has been deposited in the library of the Royal Entomological Society of London.

Material examined.

The specimens studied were from Fleet Paymaster T. Bainbrigge Fletcher's collection, from Dr. R. C. L. Perkins' collection (now at Oxford and kindly lent by Prof. G. D. H. Carpenter) and from my own collection (which now includes that of Mr. A. H. Hamm). The specimens of *N. panzeri* have been assigned to particular hosts because they were found near more or less pure colonies of one species, or because they were visiting a particular flower with one host. It is probable that a certain amount of wrong host-attribution has added to the apparent variation within the strains.

N. flava Panzer (referred to as *F*). Host, *Andrena jacobi* Perkins.

S. Devon, 29 ♂, 31 ♀; Monmouth, 6 ♂; Gloster West, 6 ♂, 41 ♀; Gloster East, 1 ♀; Hants South, 1 ♀; Surrey, 13 ♂, 4 ♀; Berks, 7 ♂, 15 ♀; Oxon, 1 ♂; Bucks, 6 ♂, 15 ♀; Middx., 1 ♂, 2 ♀; London, 10 ♂, 12 ♀; Kent East, 3 ♀; no data, 1 ♂. Total, 80 ♂, 125 ♀.

Four females in the Perkins collection seemed to me to be *N. panzeri* and not *N. flava*; they have been omitted from the present study. The first account of *N. flava* as British is found in Perkins (1916). In E. Stöckhert's key (1930) to the European *Nomada*, *Andrena armata* (Gmel.) (quoted as *A. fulva*) is suggested as a possible host. I suspect that this may be due to a confusion with the strain of *N. panzeri* which attacks that host; at least, in his key, some British specimens of this strain would run to *N. flava*. But it would appear also that German specimens of both species have somewhat more extensive yellow markings than do British ones.

N. panzeri Lep. (= *N. ruficornis* auct.).

All the hosts recorded below were noted by Perkins (1919).

1. Parasites of *A. armata* (Gmelin) (referred to as *PA*).

Gloster West, 2 ♀; Oxon (Univ. Parks, A. H. Hamm 1900–1924), 48 ♂, 51 ♀; Bucks, 5 ♂, 3 ♀; Surrey, 1 ♂; London, 6 ♀; locality doubtful, 1 ♀. Total, 54 ♂, 63 ♀.

2. Parasites of *A. synadelpha* Perkins (referred to as *PS*).

Devon South, 12 ♂, 24 ♀; Hants South, 1 ♂, 1 ♀; Berks, 1 ♀; Surrey, 4 ♀. Total, 13 ♂, 30 ♀.

3. Parasites of *A. helvola* (L.) (referred to as *PH*).

Devon South, 2 ♂, 9 ♀; Hereford, 1 ♀; Berks, 6 ♀; Bucks, 9 ♀. Total, 2 ♂, 25 ♀.

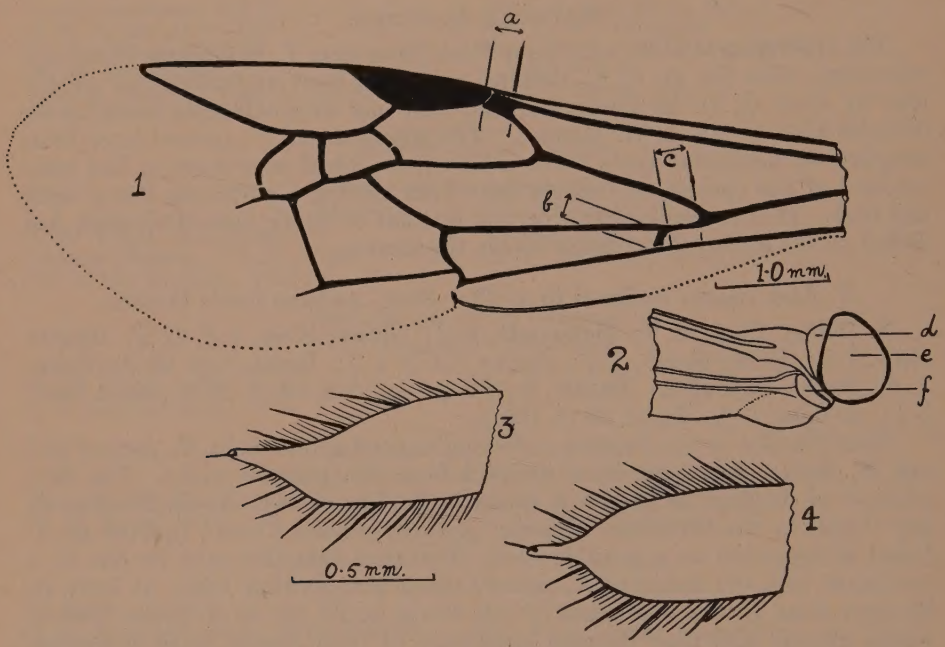
4. Parasites of *A. lapponica* Zetterstedt (referred to as *PL*).

Devon South, 8 ♂, 10 ♀; Midlothian, 7 ♂, 15 ♀. Total, 15 ♂, 25 ♀.

This series from two widely separated localities, though uniform in important particulars, is in some respects more variable than the samples of other strains. It seems likely that this is at least partly due to the sampling of only two populations which are unusually separate geographically.

5. Parasites of *A. fucata* Smith (referred to as *PF*).

Midlothian, 1 ♂; Yorks North-west, 1 ♀; Bucks, 2 ♂, 10 ♀; Devon South, 3 ♀. Total, 3 ♂, 14 ♀.



Figs. 1–4.—1. Left fore-wing of *Nomada flava* Panzer. a. Length of parastigma. b/c = postfurcal ratio (in this specimen about 0·6); 2. Base of left fore-wing of *N. flava*. d. Costal sclerite. e. Tegula. f. Median axillary sclerite; 3. Postero-dorsal view of end of mid tibia of *N. flava* ♀; 4. The same of *N. signata* Panzer ♀.

6. Parasites of *A. varians* (Rossi) (referred to as *PV*).

Surrey, 2 ♂, 1 ♀; London, 4 ♀; Kent West, 1 ♂; Essex North, 2 ♀. Total, 3 ♂, 7 ♀.

7. Host unknown.

Kildare, 1 ♂; Inverness East, 4 ♀; Devon South, 1 ♀; Dorset, 1 ♀; Hants South, 2 ♀; Hants North, 1 ♀; Sussex West, 2 ♀; Surrey, 1 ♂, 1 ♀; Berks, 3 ♂, 7 ♀; Oxon, 2 ♂, 6 ♀; Bucks, 1 ♂, 7 ♀; Essex North, 3 ♂, 2 ♀; ? Cheshire, 1 ♀; locality doubtful, 6 ♀; Germany (Harz Mts.), 1 ♀. Total, 11 ♂, 42 ♀.

Total (all strains), 101 ♂, 206 ♀.

The specimens with host unknown have been used in comparing *N. panzeri* with *N. flava* but not in analysing variation within the former species.

Characters studied.

(*a*) The length of the fore-wing was measured with a ruler from the centre of the tegula to the wing-tip and recorded to the nearest half-millimetre.

(*b*) The number of hooks on the costa of the hind-wing (hamuli) was counted.

(*c*) The length of the parastigma (fig. 1, a) was measured with a screw-eyepiece-micrometer, in units of 1/180 mm.

(*d*) The length of antennal segments 4–12 (♀) and 4–13 (♂) was measured with the micrometer.

(*e*) The width of tergite 2 across its centre and of the separation of its yellow spots were measured with the micrometer and the ratio—separation/width—calculated.

(*f*) The postfurcal ratio (fig. 1, b/c) was estimated by eye to one decimal place, under a low-power binocular.

(*g*) In ♀, the size of the red spots on the postscutellum was recorded in four classes :—large, moderate, small, absent.

(*h*) In ♀, the size of the red spots on the triangular dorsal area of the propodeum was recorded in the same four classes.

(*i*) In ♂, the red spots on the scutellum were recorded in the same four classes.

(*j*) In ♀, the upper red spot on the mesopleuron and its separation from the large red spot below was recorded as follows :—spots united; isolated, upper spot normal; isolated, upper spot small; upper spot absent.

(*k*) In ♂, the upwards extension of the yellow side-marks of the face was recorded with reference to the antennal sockets.

(*l*) In ♂, the yellow prepectal spot was recorded in classes :—large, moderate, small, absent.

(*m*) In ♂, the number of antennal segments dorsally blackened was recorded.

(*n*) In ♂, the greatest width of the mid femur and the average width of the ventral pubescent fringe were measured with the micrometer and the ratio—length fringe/width femur—was calculated. Certain characters were only measured in about half the specimens of *N. flava*.

Key to species and strains.

Females.

1. Propodeum with long pubescence, its sides with honeycomb-like punctures. Process at end of mid tibia, in postero-dorsal view, more pointed, not parallel-sided. Pronotum yellow-marked. Postfurcal ratio usually large (fig. 1, b/c) . . . . . *N. lineola* Panzer.
–. Propodeum with short pubescence, its sides with fine, mostly granulate punctures. Pronotum not yellow-marked . . . . . 2.
2. Abdomen more densely punctured, posterior impression of tergite 4 punctured for at least half its area. Process at end of mid tibia (fig. 4), in postero-dorsal view, long, parallel-sided, finger-shaped. Propodeum yellow-marked, pubescence on its angles a little longer and denser. Mesonotum mainly black on posterior half. Yellow band of tergite 2 not even partly divided anteriorly. Antennae as in *N. panzeri* *N. signata* Panzer.
–. Impression of tergite 4 unpunctured or with few punctures at sides. Propodeum very rarely yellow-marked (3 in 331 ♀), pubescence shorter. Mesonotum often more red than black, even posteriorly. Yellow band

of tergite 2 nearly always at least partly divided. Process at end of mid tibia (fig. 3), in postero-dorsal view, usually shorter and more tapering . . . . . 3.

3. Short pubescence on ventral part of propodeum and on hind coxa yellowish or brownish, fading to off-white. 91% of specimens with wing-length of 8·5 mm. or more. Postfurcal ratio 1·0 or less in 82% of specimens. Dorsal red spot of mesopleuron joined to ventral one in 25% of specimens. Red markings of postscutellum and of dorsal area of propodeum small or absent except in about 5% of specimens. Antennae somewhat longer in specimens of same size . . . . . *N. flava* Panzer.

–. Short pubescence on ventral part of propodeum and on hind coxa silvery white. 72% of specimens with wing-length of 8·0 mm. or less. Postfurcal ratio greater than 1·0 in 93% of specimens, 2·0 or more in 51%. Dorsal red spot of mesopleuron joined to the ventral one in 65% of specimens, most exceptions being small individuals. Red markings on postscutellum and dorsal area of propodeum large in about 30% of specimens. Antennae somewhat shorter in specimens of same size *N. panzeri* Lepeletier. 4.

4. Small (av. wing-length 7·0 mm.), dark form; abdomen unusually dark red, pale markings of thorax reduced, upper mesopleural red spot rarely united to lower one and often absent. Dorsal area of propodeum rarely red-marked. Yellow spots of tergite 2 unusually widely separate. Wings rather strongly infuscate. Antennae not short for size of insect. Parasites of *A. fucata* Smith.

–. Usually larger (nearest average wing-length 7·56 mm.). Colours less dark. Yellow spots of tergite 2 usually less separated except in parasites of *A. lapponica* which have the antennae relatively short . . . . . 5.

5. Spots of tergite 2 usually widely separate and antennae relatively short (av. length of segments 4–12, 2·95 mm.). Upper red mesopleural spot usually isolated from lower one . . Parasites of *A. lapponica* Zetterstedt.

–. Spots of tergite 2 less widely separate and antennae longer (av. length of segments 4–12, 3·5 mm. or more). Upper red mesopleural spot usually united to lower one . . . . . 6.

6. The largest strain (av. wing-length 8·06 mm.). Spots of tergite 2 tending to be less widely separate. Red spots of dorsal area of propodeum usually large (in 65% instead of in 13–29% of specimens). Red markings of postscutellum larger . . . . . Parasites of *A. armata* (Gmelin).

–. Usually smaller (parasites of *A. synadelpha* Perk. not significantly so). Spots of tergite 2 more often well separated. Dorsal area of propodeum and of postscutellum less often with large red markings. Parasites of *A. synadelpha* Perkins, *A. helvola* (L.) and *A. varians* (Rossi) which do not differ significantly from one another.

Males.

1. Median axillary sclerite (fig. 2, f) black and yellow. Yellow side-marks of face extending up to level of antennal sockets. Abdomen normally black and yellow, tergite 2 very nearly yellow right up to its anterior margin. Mid femur with ventral pubescent fringe longer than half width of femur. Process at end of mid femur (cf. fig. 3), in postero-dorsal view, broad at base and narrowing regularly to its tip. Scape yellow beneath, flagellum relatively short. Postfurcal ratio (fig. 1, b/c) usually large . . . . . *N. lineola* Panzer.

–. Either median axillary sclerite testaceous (or mainly so) or yellow side-marks of face not extending up so far. Abdomen normally reddish, black and yellow, but the reddish may be inconspicuous in some very yellow-marked specimens . . . . . 2.

2. Median axillary sclerite black or piceous. Yellow side-marks of face not extending up to level of antennal sockets. Abdomen with tergite 2 yellow right up to its anterior margin and with only a faint trace of an emargination there in centre of yellow band. Postfurcal ratio large. Mid femur with ventral pubescent fringe longer than half width of femur. Scape yellow beneath. Antennae as in *N. panzeri*. Process at end of mid tibia, in postero-dorsal view, almost parallel-sided, tip somewhat blunt . . . . . *N. signata* Panzer.

–. Median axillary sclerite mainly or entirely testaceous; sometimes somewhat infuscate but never really black. Yellow side-marks of face produced up to level of antennal sockets except in one strain of *N. panzeri* in which the yellow band of tergite 2 is more distinctly divided; this band is divided into two spots in about half the specimens of *N. flava* and *N. panzeri* and even when continuous it is nearly always emarginate anteriorly. Process at end of mid tibia, in postero-dorsal view, narrower and much more pointed . . . . . 3.

3. Ventral pubescent fringe of mid femur usually about 0·3 as long as width of femur, only in 24% of specimens 0·4–0·55. Postfurcal ratio 1·3 or less in 85% of specimens. Dorsal black markings of antenna extending to segment 10 or farther in 86% of specimens. Antennae longer in specimens of same size . . . . . *N. flava* Panzer.

–. Ventral pubescent fringe of mid femur 0·5–0·8 of femur-width in 86% of specimens, 0·4–0·5 in 12%, less than 0·4 in 2% (parasites of *A. armata* (Gmelin)). Postfurcal ratio 1·4 or greater in 95% of specimens. Dorsal black markings of antenna extending no farther than segment 8 in 92% of specimens . . . . . *N. panzeri* Lepeletier. 4.

4. Yellow side-markings of face nearly always ending well below lower edge of antennal socket. Red markings of scutellum usually well developed. Yellow spots of tergite 2 usually a little more widely separate. Antennae shorter, size smaller (av. wing-length, 6·8 mm.)
Parasites of *A. lapponica* Zetterstedt.

–. Yellow side markings of face nearly always ending at or above the lower edge of antennal socket. Yellow spots of tergite 2 less widely separate. Antennae longer, size larger (av. wing-length, 7·62–7·90 mm.) . . . . 5.

5. Red markings of scutellum large or moderate in half of 54 specimens. Yellow spot of prepectus larger. Flies earlier
Parasites of *A. armata* (Gmelin).

–. Red markings of scutellum large or moderate in only one out of 13 specimens. Yellow spot of prepectus smaller. Flies later
Parasites of *A. synadelpha* Perkins.

Not enough material was available to define the males of the other strains.

On the continent, *N. glabella* Thomsen is a species attached to *A. lapponica* Zetterstedt. Compared with the strain of *N. panzeri* attached to that host, it is darker, with the red markings of the postscutellum, propodeum and mesopleuron more reduced, the antennae shorter and thicker, the scutellum somewhat more depressed in the centre, and the postfurcal ratio smaller.

The characters of the strains.

In comparing metrical characters, the first stage is to calculate the mean value (= *M*) and the standard deviation (= *S.D.*) of each character and to test if the differences between them are significant. This is decided by the value of *P*, $P < 0{\cdot}05$ (or 1 in 20) being counted as significant. Most of the characters are found to be correlated with wing-length, so that a difference,

say, in hamuli between two strains might imply no more than that the strains differed in size. This point is investigated by calculating the regression coefficient, b, of the character on wing-length. If b is significant there is a real relationship. However, for a size-difference to account for the whole of the difference between two strains in another character, not only must b_1 and b_2 be identical, but $\frac{M_1-M_2}{m_1-m_2}$ must $= b$. Below, only those characters which were found to be more important are tabulated in full.

For some characters (*f*, *g*, *i*, *j*, *k*, *m*), the essential data have already been given in the key.

Character (*a*)	Strain and sex	No. spec.	$m \pm S.D.$	Significance (value *P*)	*b*
			mm.		
Wing-length	*F* ♀	125	9·05±0·5291	compared all strains *P*	
,,	*F* ♂	80	8·48±0·7993	<0·01	
,,	*PA* ♀	63	8·06±0·6868	<0·01, except *PS* (not sign.)	
,,	*PA* ♂	54	7·90±0·6962	*PS* 0·05–0·02, *PL* <0·01	
,,	*PS* ♀	30	7·85±0·6453	*PL* and *PN* (not sign.)	
,,	*PS* ♂	13	7·46±0·5357	*PL* <0·01	
,,	*PH* ♀	25	7·62±0·5454	<0·01, except *PL* and *PS* (not sign.)	
,,	*PH* ♂	2	7·25		
,,	*PL* ♀	25	7·56±0·5649	<0·01, except *PH* and *PS* (not sign.)	
,,	*PL* ♂	15	6·80±0·5278	<0·01 *PA* and *PS*	
,,	*PF* ♀	14	7·00±0·8086	<0·01, except *PL* 0·02–0·01	
,,	*PF* ♂	3	6·50		
,,	*PV* ♀	7	7·57±0·6726	other strains (not sign.)	
,,	*PV* ♂	3	6·83		
Hamuli (*b*)	*F* ♀	125	10·55±0·9627	compared all strains *P*	+0·7456
,,	*F* ♂	80	8·48±0·7993	<0·01	
,,	*P* ♀	164	8·28–8·87		+0·6471 to +1·1765
,,	*P* ♂	90	7·33–8·22		
Parastigma (*c*)	*F* ♀	81	0·257±0·0206	<0·01, except *PA* and *PV* (not sign.)	+2·9121
,,	*F* ♂	41	0·217±0·0270	<0·01 (*PA*, *PS*, *PL*)	
,,	*P* ♀	164	0·227–0·258		+2·9034 to 5·0145
,,	*P* ♂	90	0·204–0·230		

The parastigma in *F* is absolutely larger but relatively smaller than in *P*. Thus the largest forms of *P* (*PA* ♀) do not differ from it significantly.

In this character, in the ♀, the only significant values of *b* are:—*F* = —0·0256; *PA* = — 0·0495; *PH* = — 0·0766. The value for *F* differs significantly from the other two.

The distribution of the value of the ratio is too far from normal to apply the " t " test to differences in the means.

Character (*d*)	Strain and sex	No. spec.	$m \pm S.D.$	Significance (value *P*)	*b*
			mm.		
L. ant. 4–12	*F* ♀	81	4·20±0·2178	<0·01 all strains of *P*	+0·3603
L. ant. 4–13	*F* ♂	39	4·03±0·3142		
L. ant. 4–12	*PA* ♀	63	3·70±0·2817	<0·01 all other strains *P* except ♀*PS* (about 0·02)	+0·3092
L. ant. 4–13	*PA* ♂	54	3·68±0·2897		
L. ant. 4–12	*PS* ♀	30	3·54±0·1164	about 0·02 except ♀ *PH*, *PV* (not sign.)	+0·4881
L. ant. 4–13	*PS* ♂	13	3·29±0·2125		
L. ant. 4–12	*PH* ♀	25	3·52±0·1136	*PL* and *PF* <0·01	+0·2813
L. ant. 4–13	*PH* ♂	2	3·58		
L. ant. 4–12	*PL* ♀	25	2·95±0·2176	*PF* <0·01	+0·2631
L. ant. 4–13	*PL* ♂	15	3·06±0·2324		
L. ant. 4–12	*PF* ♀	14	3·26±0·3413		+0·3493
L. ant. 4–13	*PF* ♂	3	3·22		
L. ant. 4–12	*PV* ♀	7	3·51±0·2856		
L. ant. 4–13	*PV* ♂	3	3·37		

RATIO OF SEPARATION OF SPOTS OF TERGITE 2 TO WIDTH OF TERGITE.

Character (*e*) Strain and sex	0–0·05	0·06–0·10	0·11–0·15	0·16–0·25	0·26–0·35	0·36–0·45	0·46–0·55	0·56–0·65	0·77
F ♀	11	24	23	21	1	0	0	1	
F ♂	17	11	9	4					
PA ♀	5	9	18	21	6	4			
PA ♂	53	1							
PS ♀	2	7	5	4	5	6	1		
PS ♂	5	5	1	1	1				
PH ♀	2	2	6	11	2	2			
PH ♂	1	1							
PL ♀			1	2	12	3	6	0	1
PL ♂	2	2	1	7	3				
PF ♀				6	4	1	3		
PF ♂	2	0	0	0	0	1			
PV ♀	2	1	2	2					
PV ♂	3								

EXTENSION UPWARDS OF YELLOW SIDE-MARKS OF FACE IN ♂ (*k*).

The yellow side-marks extend to somewhere between the level of the bottom and the top of the antennal sockets, in all strains except:—*PL* 1 somewhat below, 14 well below; *PS* 3 just below. The side-marks tend to extend upwards very slightly farther in *F* than in *P*.

Ratio of width of fringe of ♂ mid femur to width of femur (*n*). Regression on wing-length:—$F\ b = -0{\cdot}03023$ (*P* nearer 0·01 than 0·02); $PA\ b = -0{\cdot}06209$ ($P < 0{\cdot}01$). These two values do not differ significantly and the values of *b* in *PS* and *PL* are not significant.

Strain	Red markings of dorsal area of ♀ propodeum (*h*)				Upper red mesopleural spot in ♀, and its separation from lower one (*j*)			
	Absent	Small	Moderate	Large	Absent	Small, isolated	Normal, isolated	United
F	96	19	9	1	7	11	75	32
PA	3	7	12	41	0	4	2	57
PS	9	8	9	4	4	1	6	19
PH	3	11	6	5	0	3	2	20
PL	8	8	5	4	3	9	10	3
PF	12	0	1	1	6	3	2	3
PV	2	1	2	2	0	0	0	7

Strain	Red markings of ♂ scutellum (*i*)				Size of yellow spot on ♂ prepectus (*l*)			
	Absent	Small	Moderate	Large	Absent	Small	Moderate	Large
F	31	4	3	3	1	23	16	1
PA	11	16	7	20	0	31	14	9
PS	9	3	0	1	7	5	1	0
PH	0	1	0	1	0	1	1	0
PL	0	3	3	9	9	6	0	0
PF	3	0	0	0	2	1	0	0
PV	1	1	0	1	1	1	1	0

Dates of capture.

Strain and sex		No. of specimens	First date	Mean date	Last date
F	♀	96	24.iv.	20.v.	26.vi.
	♂	43	24.iv.	13.v.	13.vi.
PA	♀	50	22.iv.	8.v.	13.vi.
	♂	47	17.iv.	2.v.	24.v.
PS	♀	27	7.v.	21.v.	7.vi.
	♂	12	12.v.	22.v.	10.vi.
PH	♀	24	28.iv.	19.v.	7.vi.
	♂	2	14.v.	16.v.	17.v.
PL *	♀ (a)	15	21.v.	4.vi.	20.vi.
	♀ (b)	10	28.iv.	28.iv.	28.iv.
	♂ (a)	7	2.vi.	3.vi.	6.vi.
	♂ (b)	8	25.iv.	28.iv.	28.iv.
PF	♀	14	27.iv.	28.v.	5.vii.
	♂	3	17.iv.	30.iv.	27.v.
PV	♀	2	29.v.	29.v.	29.v.
	♂	3	26.iv.	5.v.	10.v.

* (a) Midlothian, (b) S. Devon.

Significance of mean dates (♀).

F differs significantly from *PA* ($P < 0{\cdot}01$) and from both lots of *PL* (not from *PF*, *PS* and *PH*).

PA differs significantly ($P < 0{\cdot}01$) from both lots *PL*, *PS*, *PH* and *PF*.

PL differs significantly ($P < 0{\cdot}01$) from *PS* and *PH*, but only Devon *PL* differs significantly from *PF*.

PF, *PS* and *PH* do not differ significantly.

Character and mode of evolution of the strains.

It is impossible to establish without breeding experiments whether the strains of *N. panzeri* differ genetically or whether their characters are wholly dependent on the different environments in which they breed. If, as is probable, their differences are at least in part genetic, it is interesting to speculate how they may have been evolved.

Although most of the host bees are common and often occur in one district, real mixed colonies (*i.e.*, on the same bank) are less usual, so that a small degree of spatial isolation is to be expected. This will be more marked where the host, as in *A. armata*, tends to live in compact colonies. On the other hand, each strain will be composed of a large number of separate populations, each more or less attached to separate host-colonies.

There are differences, though more or less overlapping, in the dates at which the host-females nest, and the flight of the parasites is rather well adjusted to that of its host (normally a little later). It will be seen from the table that when the mean dates of capture are compared (females), more than half the comparisons are significant. The results would probably be more striking if longer series were available.

The tendency to visit the same flowers as the host, already noted by Perkins (1919 : 231) for *Nomada* in general, is also shown to some extent by the strains, e.g., *A. fucata* Smith and its parasite on raspberry in Bucks; *A. synadelpha* Perkins and its parasite on *Rhamnus* in Berks and Surrey; *A. helvola* (L.) and its parasite on *Euphorbia amygdaloides* in Berks and Bucks. The flower visited is rarely the only one available, so that the difference in behaviour seems to be real. Since males and females both go to the flowers, the tendency towards isolation is somewhat increased.

There is no evidence to decide whether the strains have evolved, so to speak, *in situ*, or whether they evolved in separate areas and have subsequently increased their geographical ranges so as to overlap. Apart from theoretical difficulties, the former supposition is the more natural one.

One of the most important characters in which the strains differ is size (measured by wing-length). Of 15 possible comparisons (omitting *PV*), 12 are significant. But almost every other character measured is correlated with wing-length. Besides the five characters whose regressions on wing-length have actually been calculated, it can also be shown that the postfurcal ratio and the various red markings are clearly related to wing-length. For instance, if the four classes of mesopleural markings in the female are given arbitrary numerical values 1, 2, 3 and 4, the regressions on wing-length are significant in *F*, *PL* and *PH*. Similarly for the markings of the dorsal area of the propodeum in *F*, *PA* and *PH*. A considerable part, therefore, of the difference between the strains is only a consequence of their different mean sizes, which appear to be loosely related to the sizes of the hosts. On the other hand, it

seems as if the relation between wing-length and the other characters is a little different in each strain. This, I think, strongly suggests a slight genetic difference between at least the more distinct of the strains. Factors increasing size acting on a slightly different system do not produce quite the same result.

Nomada flava, of course, though broadly speaking an extreme form of *N. panzeri*, is very much more distinct, though intermediate specimens can still be found.

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Stöckhert, E., *in* Schmiedeknecht, O., 1930, *Die Hymenopteren Nord- und Mitteleuropas*. Jena.

THE SHALLOT APHIS, *MYZUS ASCALONICUS* SP. N. (HEMIPTERA, APHIDIDAE)

By J. P. Doncaster, M.A., F.R.E.S.

(*Rothamsted Experimental Station, Harpenden, Herts.*)

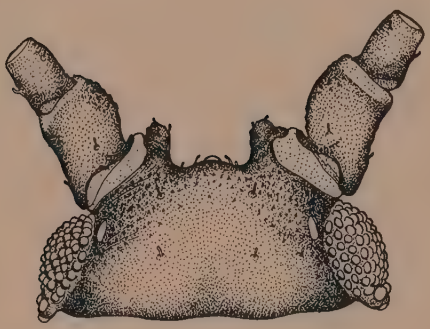
In December, 1941, specimens were received from Spalding, Lincolnshire, of a hitherto undescribed aphis causing damage to shallots in storage. The original sample contained apterae only, but both apterous and alate viviparae of this species have since been taken in various parts of Britain on many occasions, though sexuales have not been found. This aphis occurs commonly on the stored bulbs of shallots and onions during the winter, and on one occasion stored tulip bulbs were found to be heavily attacked. Moreover, it will infest onions and allied plants in all stages of growth, and may also colonise a variety of other hosts, including lettuce and seedling brassicae under glass, and many common weeds. It is noteworthy that so far this species has been found in nature only during the winter and spring, though cultures of it on shallots and onions can be maintained without difficulty under artificial conditions throughout the year. That it is an efficient vector of several plant viruses has been shown by laboratory tests, an account of which, together with notes on its biology and distribution, is in course of preparation.

Taxonomy.

This species possesses the rugose converging frontal tubercles, swollen siphunculi, and ventral sclerites on abdominal segments III–VI in the alatae, which are characteristic of the subgenus *Nectarosiphon* Schouteden of *Myzus* Pass.,[1] but it differs from *Nectarosiphon* in the possession normally of three setae on the first joint of the hind tarsi (at least in the alatae). It agrees with the characters of *Myzus* as a whole in all respects except one: namely, the arrangement in the alatae of the secondary rhinaria, which in *Myzus* are confined to the third antennal joint, with exceptionally a few on the fourth. A remarkable feature of the new species is the great variability in the numbers and arrangement of the rhinaria in the alatae. Specimens have been found showing all gradations between a typical *Myzus*-like sensoriation, consisting of a few rhinaria confined to antennal joint III, and a type in which numerous rhinaria occur over the whole of joints III, IV, and V. Moreover, it is not uncommon to find a single specimen bearing one antenna of each type. Had the presence of rhinaria on joints III–V been constant in all individuals it would have been necessary to erect a new genus for the inclusion of this species; but in view of the instability of this character, such a course is considered unjustifiable, and the aphis has therefore been placed in the genus *Myzus*, with the specific name *ascalonicus* in reference to its association with the shallot (*Allium ascalonicum* L.).

[1] In this connection Mr. Ris Lambers writes: "*Myzodes* Mordv. 1914, type *Myzodes tabaci* Mordv. (= *Aphis persicae* Sulzer) is a synonym of *Nectarosiphon* Schouteden 1901 (*nom. nov.* for *Macrosiphum* Del Guercio 1900, *nec* Passerini 1860). Following Baker's (1920) Generic Classification, *Aphis convolvuli* Kalt. (= *Aphis persicae* Sulzer) is the type of *Macrosiphum* Del Guercio and therefore of *Nectarosiphon* Schouteden, a subgenus of *Myzus* Pass."

1



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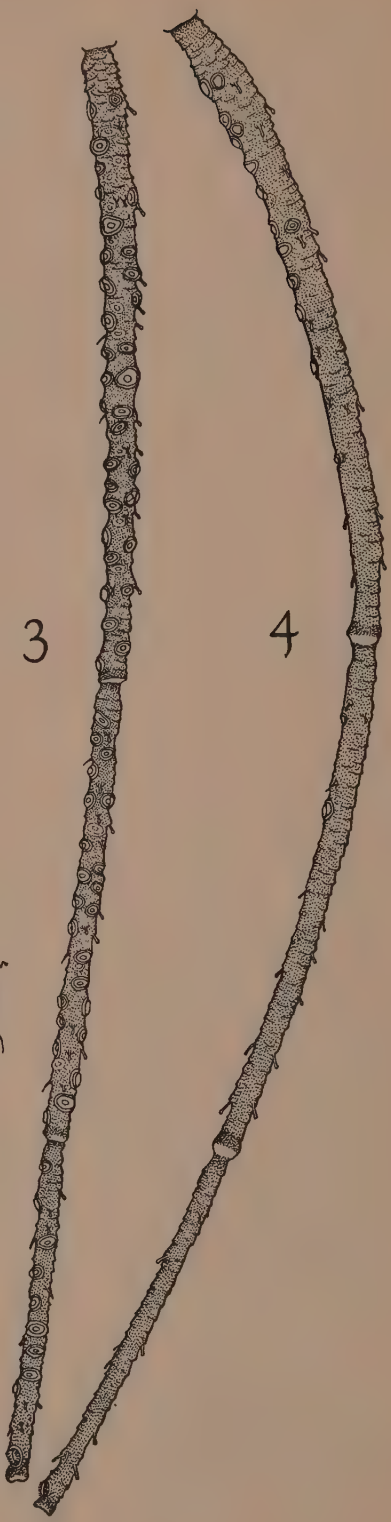

3 4

When specimens of *Myzus ascalonicus* were first examined, the strongly convergent frontal tubercles, swollen siphunculi, and slightly clouded wing veins suggested the possibility that the species might belong in the genus *Micromyzus* v. d. Goot (3). *Fullawayella formosana* Takah. (= *Micromyzus alliumcepa* Essig) has been described by Essig as infesting onions in California (2), and *Micromyzus oliveri* Essig, a species closely allied to it, has, according to Doucette (1), a host range very similar to that of *M. ascalonicus*. The published descriptions of these two species, however, showed slight but consistent structural and other differences when compared with *M. ascalonicus*. Specimens of *M. ascalonicus* were sent recently to Mr. Ris Lambers, who very kindly compared them with material of *F. formosana* from California, and concluded that the two were entirely distinct and belonged in different genera.

Myzus ascalonicus sp. n.

Apterous viviparous female.

Colour of living specimen : Head, thorax and abdomen uniformly pale brown, greenish-brown or dull yellow in all stages; occasionally some adults show irregular dark olive-green markings on the abdomen, caused by the body contents showing through the transparent integument. Dorsum strongly convex, shining. Eyes black. Antennae pale, except for apex of joint V and the whole of VI, which are dark. Legs pale, with the apices of the tibiae and the whole of the tarsi dark. Siphunculi and cauda pale.

Macerated specimen : Body oval. Integument with faint irregular striations which, on the abdomen, may coalesce to form a pattern of more or less elongated transverse reticulations. Dorsal setae short (about 0·01 mm.), expanded apically, but not truly capitate. Ventral setae longer, acute. Head : dorsal integument covered with minute spinules which extend on to the ventral surface and are present also, though less numerous, on antennal joints I and II. Frontal tubercles well developed, the inner surface of each expanded into a rounded rugose projection, bearing normally 3 short setae on the apex and one or two longer ones at the base (fig. 1). Cephalic setae long, expanded apically. Antennae as long as, or slightly longer than, the body, with no secondary rhinaria. I with inner margin rugose, II normal, III, IV, and V faintly imbricated, VI strongly so. Antennal setae expanded apically, rarely acute, most numerous along anterior border of III, in length about equal to half basal diameter of III. Rostrum reaches to or beyond third coxae, apical joint about $1\frac{1}{3}$ times as long as second joint of hind tarsus, with 8–12 acute setae (in addition to the normal 3 pairs at the apex). Siphunculi slender, with the base slightly expanded, the basal half narrow, and the distal half distinctly swollen, narrowing again towards the apex. The diameter at the narrowest part below the swelling is never greater than that at the apex immediately behind the flange. The whole faintly imbricate, with one or two apical striae and distinct flange. Cauda bluntly triangular, with 6, rarely 7, setae. Anal plate spinulose with normally 6 long acute setae. Genital plate roughly semicircular, with a row of 8–12 short setae on the posterior margin, and one pair of long acute setae on the anterior half, which may bear one or two short apically

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Figs. 1–7.—1, Head of apterous viviparous female, × 112; 2, head of alate viviparous female, × 112; 3, antennae of alate viviparous female, joints III–V (form with many rhinaria), × 112; 4, antenna of alate viviparous female, joints III–V (form with few rhinaria), × 112; 5, siphunculus of apterous viviparous female, × 212; 6, cauda of apterous viviparous female, × 212; 7, cauda of alate viviparous female, × 212.

expanded setae also. Legs: coxae with very few minute spinules; coxae and trochanters with a few long acute setae. Femora and tibiae with both apically expanded and acute setae, the former predominating along the outer margins, except at apices of tibiae where all are acute. Acute setae about equal in length to diameter of tibia, others slightly shorter. Setae on first tarsal joints: fore 3, mid 3, hind normally 2, less often 3.

Measurements of one specimen: Length of body (frontal tubercle to apex of cauda): 1·73 mm.; breadth of body: 1·03 mm.; length of antenna: 1·76 mm.; siphunculus: 0·26 mm.; cauda: length 0·10 mm., width at base: 0·08 mm.; antennal joints: $\frac{0{\cdot}16}{\text{I}}$; $\frac{0{\cdot}07}{\text{II}}$; $\frac{0{\cdot}44}{\text{III}}$; $\frac{0{\cdot}32}{\text{IV}}$; $\frac{0{\cdot}26}{\text{V}}$; $\frac{0{\cdot}13+0{\cdot}40}{\text{VI}}$ mm. Secondary rhinaria absent.

Alate viviparous female.

Colour of living specimen: Head and thorax black, shining. Eyes black. Rostrum and antennae black. Abdomen dark green, with black sclerotic markings more or less variable, but typically as follows:—Tergite I: a transverse row of six elongate or subcircular spots, the two outermost the largest, along anterior margin; an irregular transverse band, sometimes broken in the middle, along posterior margin. Tergite II: as tergite I with the addition of a pair of large oval spots at the lateral extremities. Tergite III with a transverse row of spots as in I and II, but with the transverse band broader, unbroken, and coalescing with similar bands on IV, V, and VI to form a large irregular dorsal patch. Lateral spots on IV and V distinct. Tergite VII with a continuous irregular transverse band extending the whole width, VIII with a narrow band along the posterior border. Large irregular black sclerotic areas occur laterally on the abdominal sternites. Genital and anal plates black, siphunculi black, cauda dusky. Legs black, except bases of femora. Wing veins dark with more or less faintly and narrowly clouded borders.

Macerated specimen: Integument of abdomen with minute spinules usually occurring in short overlapping rows, sparse on the dorsum, very numerous on the venter. Body setae as in apt. viv. fem. Head: dorsal integument with spinules, but fewer in number than in apt. viv. fem.; not arranged in rows. Frontal tubercles and cephalic setae much as in apt. viv. fem. In some specimens the vertex may bear one, more often two, large tubercles near the posterior border. Antennae slightly longer than the body. Numbers and arrangement of secondary rhinaria extremely variable; III, 8–50; IV, 0–32; V, 0–14. In specimens with few rhinaria, the latter are small, subcircular, nearly flush with the surface, and confined to the posterior margin of the basal half of III (fig. 4). In forms with many rhinaria the latter are large, oval, with raised rims (fig. 3), and occur over the whole surface of joints III, IV, and V and pale central fenestra. Antennal setae shorter than in apt. viv. fem., about equal to one-third of basal diameter of III. Rostrum reaches to second coxae, apical joint about $1\frac{2}{5}$ times as long as second joint of hind tarsus, with 10–16 setae in addition to the three apical pairs. Siphunculi with the basal portion rather more slender than in apt. viv. fem. Cauda with the apex more acute than in apt. viv. fem., and with a distinct constriction about midway between base and apex. Anal and genital plates as in apt. viv. fem. Setae on first tarsal joints: fore 3, mid 3, hind normally 3, less often 2. Wing venation normal aphidine, frenulum with 2–6, normally 4, hooks.

Measurements of one specimen: Length of body: 2·21 mm.; breadth of body: 0·97 mm.; length of antenna: 2·60 mm.; siphunculus: 0·26 mm.; cauda: length, 0·12 mm., width at base, 0·10 mm.; antennal joints: $\frac{0{\cdot}17}{\text{I}}$; $\frac{0{\cdot}09}{\text{II}}$; $\frac{0{\cdot}66}{\text{III}}$; $\frac{0{\cdot}55}{\text{IV}}$; $\frac{0{\cdot}42}{\text{V}}$; $\frac{0{\cdot}14+0{\cdot}55}{\text{VI}}$ mm. Secondary rhinaria: III: 44 and 48; IV: 25 and 32; V: 11 and 13.

Host Plants: Shallot (*Allium ascalonicum* L.), Onion (*Allium cepa* L.), Lettuce (*Lactuca sativa* L.), Cabbage (*Brassica oleracea* L.), Tulip (*Tulipa* sp.), Strawberry (*Fragaria* sp.), *Chrysanthemum* sp., *Aubrietia* sp., *Arabis* sp., *Campanula* sp. (garden), *Cerastium* sp. (garden), *Aquilegia* sp., Valerian (*Centranthus ruber* DC), Chickweed (*Stellaria media* Vill.), *Crepis biennis* L., Dandelion (*Taraxacum officinale* Web.).

Acknowledgments.

I am indebted to Mr. H. Ris Lambers for his advice on the correct systematic position of this aphis and for his help in the preparation of the manuscript, and to Dr. I. Thomas for his co-operation throughout the work. This work was carried out while holding a temporary post as Research Officer of the Agricultural Research Council.

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Book Notice.

The Aphidiinae of North America (*Braconidae: Hymenoptera*). By C. F. Smith. Pp. xii + 154, 17 pls. (included in pagination). 8vo. Columbus (Ohio State University), 1944. (Contributions in Zoology and Entomology No. 6.)

This book is a systematic treatise on some Braconid parasites of Aphids. It has been written after " a careful study of the types of Ashmead, Fitch, and Gahan, . . . Cresson . . . and Viereck," the study of the existing types being supplemented by cotype and homotype material and examination of a large series of reared specimens.

The work includes a redescription of " all the established species of North America," and gives the description of 3 new subgenera and some 30 new species.

The bibliography contains only 12 entries of which but a single reference is to a work published before 1850 ! There are, however, many earlier references to literature given in the synonymy at the head of each description, such references being omitted from the " Bibliography."

The book is very attractively produced on good paper in a good binding.

FURTHER NOTES ON THE HEMIPTEROUS GENERA *CALIDEA* LAPORTE (SCUTELLERINAE) AND *NEZARA* AMYOT & SERVILLE (PENTATOMINAE)

By Paul Freeman, A.R.C.S., B.Sc., F.R.E.S.

These notes are a continuation of my previous two contributions to the systematics of these genera (*Calidea in* Freeman, 1939, *Trans. R. ent. Soc. Lond.* **88 :** 139–160; *Nezara in* Freeman, 1940, *ibid.* **90 :** 351–374).

I recently visited the Belgian Congo Museum near Brussels where Dr. Schouteden kindly allowed me to examine the types of the species and varieties described by him and contained in the collection of the Museum. The results of my examination of these types are given below.

Calidea dregii Germar var. *apicalis* Schouteden, 1903. The type agrees with my description.

Calidea hutereauae Schouteden, 1917. There were four specimens labelled " type ". They all agree with my description. There were some specimens in the collection which had a small yellowish costal stripe which amends slightly my description.

Nezara congo Schouteden, 1905. The type is a normal female of *N. robusta* Distant, 1898. Therefore the name *congo* Schouteden becomes a synonym of *robusta* Distant.

There was a number of specimens grouped as *N. congo* and *N. robusta* in the collection which would repay further study. In the limited time at my disposal I was unable to make more than a cursory examination of what appeared to be males of *N. niamensis* (Distant, 1890) and specimens which appeared to be intermediate between *N. robusta* Distant and *N. immaculata* Freeman, 1940. A more detailed examination might show that these forms were only extreme varieties of *N. robusta* Distant.

Nezara soror Schouteden, 1905. The type, a male from Tamatave, Madagascar, agrees with my description.

Nezara naspirus (Dallas) var. *subviridula* Schouteden, 1910
,, var. *vittata* Schouteden, 1910
,, var. *scutellaris* Schouteden, 1910.

The types all agree with my descriptions.

Nezara naspirus (Dallas) var. *personata* Schouteden, 1910. The type is a male from Kikuyu Estate, British East Africa, not Kilima Njaro as stated in Schouteden's original description.

The upper surface is green with purplish-red distributed as follows. *Head :* mainly reddish, with a small green area posteriorly. *Pronotum :* mainly reddish with a green longitudinal stripe centrally. *Scutellum :* green with reddish spots at the basal and apical angles. *Corium :* green suffused with reddish basally.

This is identical with my new variety *rufoguttata* Freeman, 1940. This name therefore becomes a synonym of *personata* Schouteden.

THE EUROPEAN GENERA OF TENTHREDININAE (HYMENOPTERA TENTHREDINIDAE)

By Robert B. Benson, M.A., F.R.E.S.

The purpose of this paper is to establish generic and tribal conceptions for the Tenthredininae occurring in Europe and the Mediterranean Region, with a view to using them in a synopsis of the British species.

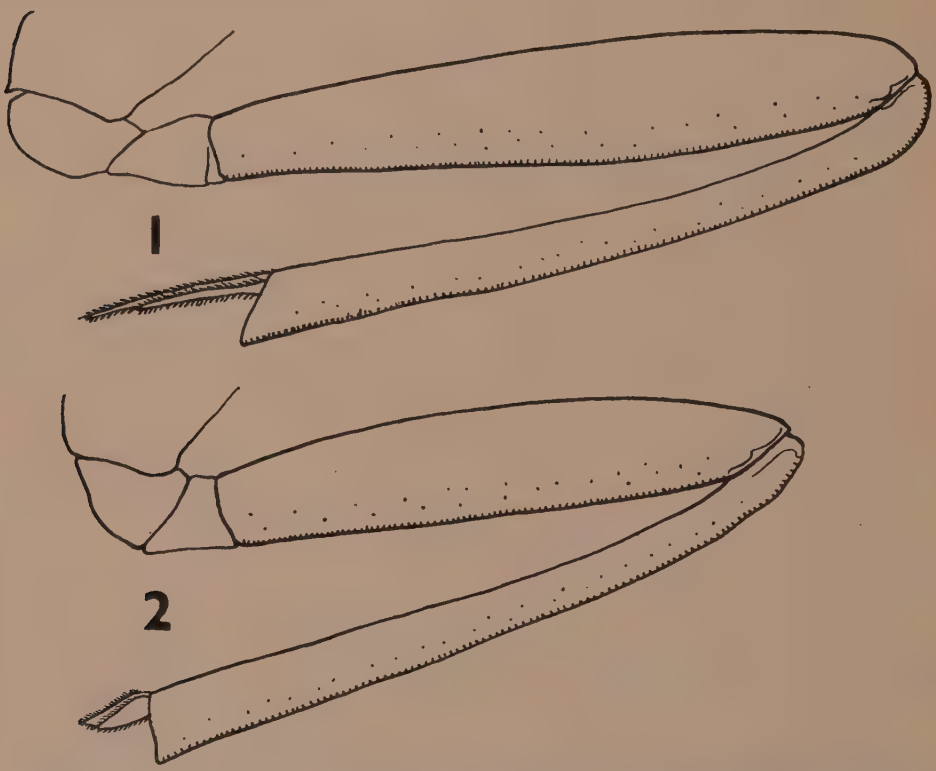
Ross (1937) recently published a revision of the Tenthredinine genera occurring in N. America, but excluded such European genera as *Sciapteryx* and *Tenthredopsis* as he did not recognise them as occurring in N. America. Malaise (1945) has recently published a key to the Eurasian genera and this naturally covers the European species, but his treatment is very different from the one adopted here. The treatment here is more akin to Ross's, save that I am introducing the tribal concept. Ross was seeking a new synthesis; Malaise further pursuing his own analysis. The difference between the outlooks of these two authors is shown very well in their different treatments of the species-group related to *Aglaostigma*, *Laurentia*, etc. Ross showed that *Aglaostigma*, *Laurentia*, *Neurosiobla*, *Parallomma* and *Macrophyopsis* formed a natural unit of closely related forms conveniently regarded as a single genus; Malaise not only retains these dismembered groups as distinct genera, but has in the meantime added *Laurentina* and now introduces *Stigmatozonus* as a subgenus of *Aglaostigma*. Further, he separates these genera on such key characters that they become widely dispersed in different sections of his key. If these genera are brought together into a single tribe, as is done here, then it makes little difference to the scheme of classification whether authors prefer to treat them as one single genus or several separate genera. Ross's actual key is unfortunately so over-simplified by stressing selected key characters at the expense of the correlations that it gives a false idea of his own sound generic conceptions and limits the use of his key to the particular fauna with which he was concerned.

The definition of the subfamily here treated as the Tenthredininae is the same as in my 1938 paper except that I now exclude *Siobla*, for it seems that *Siobla* and the other related genera, in which the anal cell of the fore-wing is crossed by an oblique cross-vein beyond the middle or without any cross-vein at all, are more closely related to the Emphytinae than to the Tenthredininae.

It is hoped that, by shifting the emphasis of characters and bringing in several not previously used, a more natural classification and easily workable key will result. For example, short-legged *Macrophya* such as *M. albipuncta* (Fall.) and *M. hispanica* Konow would not run down to *Macrophya* in any previously published key and it is a wonder that they have so far escaped new generic names.

A new genus is described for a Mediterranean group of species previously included in *Tenthredo*, but much more closely related to *Sciapteryx*; in trying to discover why this species-group had never previously been associated with *Sciapteryx*, it became obvious that one section of *Sciapteryx*, the group of green

arctic-montane species related to *S. arctica* Kiaer, should be transferred to *Rhogogaster*, giving thereby a new unity to *Sciapteryx* and a new reality to *Rhogogaster*. I have therefore discarded the idea expressed in 1943 that *Rhogogaster* should be fused with *Tenthredo* and treated as a species-group in that multiform genus.



Figs. 1–2.—Hind leg to show proportional length of femur to tibia and form of tibial spurs in *Macrophya annulata* (Geoffroy) (fig. 1) and *Sciapteryx costalis* (F.) (fig. 2).

Key to Tribes and Genera of European Tenthredininae.

1. Hind femur (excluding 2nd trochanter) as long as hind tibia (fig. 1), and coxae also enlarged so that the apex of the hind femur often reaches to the apex of the abdomen. Labrum convex, often semi-cylindrical, with the apex truncate or emarginate (fig. 9). Apical hind tibial spurs much longer than the apical breadth of the hind tibia. Anal cell of fore-wing either constricted in the middle or with a short straight cross-vein. Occipital carina well developed all round the hind margin of the head (cf. fig. 11) . . . . . .
Type : *Tenthredo rustica* auctt. *nec* L. (Westwood 1840) = *T. montana* Scop. . . . . (+ *Pachyprotasis*) *Macrophya* Dahlbom, 1835.
5. Tribe : **Macrophyini** tr. n.

–. Hind femur (excluding 2nd trochanter) shorter than the hind tibia (fig. 2), and with its apex rarely reaching the apex of the abdomen. Labrum flat or slightly convex; if emarginate it is flat except for its reflexed front margin. Tibial spurs, anal cell in fore-wing and occipital carina various . . . . . 2.

2. Labrum reflexed in front so that it appears truncate, emarginate or even deeply excised (figs. 5 and 8) and occipital carina more or less obsolete on upper hind margin of head, though developed below (fig. 12) (cf. *Aglaostigma*, fig. 10). Apical hind tibial spurs stout and short (fig. 2) (never longer than the apical breadth of the hind tibia by more than their own basal breadth). Species not green and black. Antenna shorter than $1\frac{1}{2}$ times the breadth of the head, slightly compressed, with segment 3 as long as 4 + 5, and often with only 8 segments in all
3. Tribe : **Sciapterygini** tr. n. 3.

–. Labrum normal in front and entire, except in certain green and black species (*Rhogogaster*). Occipital carina well developed, except laterally in *Aglaostigma*. Tibial spurs longer than the apical breadth of the hind tibia by much more than their own basal breadth. Antennae various, often longer than $1\frac{1}{2}$ times the breadth of the head . . . . . 4.

3. Stout, mostly black and dull, heavily punctured, insects with small eyes, much farther apart in front than the height of one. Labrum deeply reflexed in front. Clypeus with front margin evenly emarginate (fig. 8) for its whole breadth.
Type : *Tenthredo costalis* F. (monotypic) . . *Sciapteryx* Stephens, 1835.

–. Less stout insects often highly coloured and more shining through sparser punctation. Eyes large and converging strongly in front, so that they are closer together there than the height of one. Labrum with the amount of apical reflection variable. Clypeus with the front margin excised only in the middle (fig. 5).
Type : *Allantus dominiquei* Konow . . . . . **Elinora** gen. n.

4. Occipital carina well developed all round hind margin of head (fig. 11). Claws normal with long inner tooth as long or longer than the end tooth and adpressed to it. Propodeum clearly divided medially by a furrow, *or*, eyes closer together in front than the height of one. Hind-wing always with two enclosed middle cells and without a marginal surrounding vein. Clypeus deeply excised on front margin. Labrum flat, at most slightly reflexed apically (figs. 4 and 6). Anal cell of fore-wing with short straight cross-vein in all European species. Cenchri smaller and usually farther apart than the breadth of one. Scutellum obtuse or truncate in front . . . . . 4. Tribe : Tenthredinini. 7

–. Either occipital carina obsolete laterally (fig. 10), or claws with inner tooth much shorter than the end tooth and widely separated from it, or propodeum undivided medially (the furrow being obsolete or represented only by a carina). Eyes farther apart in front than the height of one (fig. 3). Hind-wing often with abnormal venation : ♀ often with only one enclosed cell and ♂ often with a surrounding marginal vein. Clypeus with the front margin subtruncate to deeply excised. Labrum often convex (fig. 3).
Anal cell of fore-wing more or less constricted in the middle or else with short straight cross-vein. Cenchri larger and closer together than the breadth of one. Scutellum acutely produced in front . . . . . 5.

5. Claws with inner tooth much shorter than end tooth and widely separated from it. Propodeum divided medially by a wide ∧-shaped excision. Labrum flat and almost triangular in shape (fig. 7)
Type : *Tenthredo rubi* Panzer (monobasic) . . *Perineura* Hartig, 1837.
1. Tribe : **Perineurini** tr. n.

–. Claws with inner tooth about as long as end tooth and closely adpressed to it. Propodeum not widely excised medially, often with the furrow replaced by a carina or even entirely obsolete. Labrum convex and rounded in front (fig. 3) . . . . . 2. Tribe : **Tenthredopsini** tr. n. 6.

6. Occipital carina obsolete laterally from mandible base to level with top of eyes (fig. 12). Propodeum usually with at least a medial furrow or carina present.
   Type: *Aglaostigma eburneiguttatum* Kirby (monobasic) = *A. nivosum* (Klug) (Malaise 1945) . . . . . *Aglaostigma* W. F. Kirby, 1882.
   (*Aglaostigma* Kirby, *Homoeoneura* Ashmead, *Laurentia* Costa *nec* Ragonot, *Parallomma* Malaise and *Macrophyopsis* Enslin.)

–. Occipital carina well developed all round hind margin of head (fig. 11). Propodeum without either medial furrow or carina.
   Type: *Tenthredo tessellata* Klug (Rohwer 1911).
   Tenthredopsis Costa, 1859.

7. Green and black species with eyes not closer together below than the breadth of the clypeus and (except in *R. picta* ♀) farther apart than the height of an eye (fig. 4). Labrum subtruncate or emarginate in front, more or less reflexed apically. Clypeus with lateral teeth truncate or with subsidiary teeth. Head and mesopleura shining without prominent crests or projections.
   Type: *Tenthredo viridis* L. (Rohwer 1911) . . *Rhogogaster* Konow, 1884.

–. Not green and black in colour, *or*, eyes strongly converging below so that they are closer together than the breadth of the clypeus or the height of an eye (cf. fig. 5). Labrum entire apically, usually rounded or acutely produced (fig. 6). Head and mesopleura may be heavily punctured and often with prominent crests above the antennae and sometimes with pyramidal projections on the mesopleura . . . . . 8.

8. Eyes small and almost twice as far apart in front as the height of one. Dull, heavily punctured dark arctic species with short compressed antennae.
   Type: *Eniscia arctica* C. G. Thomson (monotypic).
   Eniscia C. G. Thomson, 1870.

–. Eyes larger and closer together in front than the height of one. Colour, sculpture and proportions of the parts various; often highly coloured species.
   Type: *Tenthredo scrophulariae* L. (Latreille 1810). *Tenthredo* L., 1758.

1. Tribe: **Perineurini** tr. n.

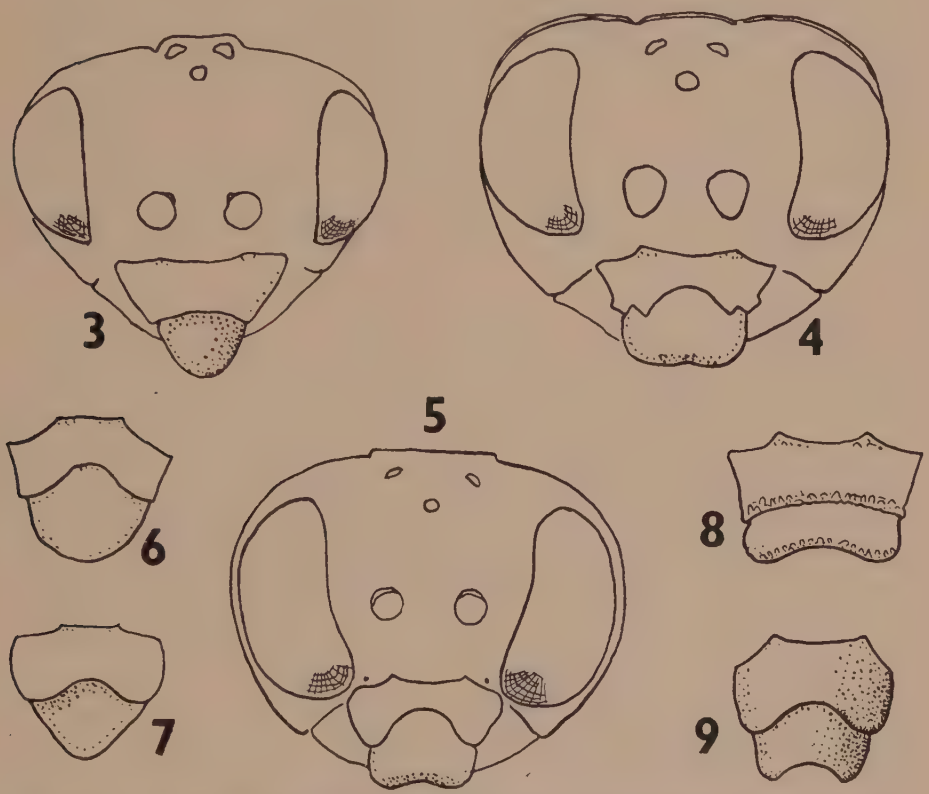
This archaic tribe contains only the European *Perineura rubi* (Panzer) and the N. American *Leucopelmonus confusus* (Norton).

2. Tribe: **Tenthredopsini** tr. n.

Tenthredopsis and *Aglaostigma* are the only two genera (or groups of genera for those who prefer) in this tribe.

The former is mainly concentrated in South-East Europe; the latter is holarctic, mainly in northern and subalpine regions, with several of the species showing the type of restricted distribution characteristic of relict forms. The characters by which Malaise separates some of the genera here grouped together as *Aglaostigma* seem to be of little significance when unsupported by any biological evidence. The differences, for instance, in the amount of convergence of the eyes in his *Allantus* and *Homoeoneura* are not in themselves very convincing after seeing what can happen in *Macrophya* or even between the sexes in *Rhogogaster picta* (Kl.). I dissected the male genitalia to see whether they gave any support to his conclusions; admittedly the shape of the penis-valve seems

to show groups of species corresponding to these genera in European material, within each group the species being almost identical, but when I studied extra-European species I found that this could no longer be maintained (cf. also Ross 1943). I therefore regard the following as being the European species of *Aglaostigma* (retaining Malaise's generic names for reference) :—*Allantus aucupariae* (Klug); *Homoeoneura discolor* (Klug); *Allantus fulvipes* (Scop.); *Homoeoneura langei* (Konow); *Homoeoneura lichtwardi* (Konow); *Macrophyopsis nebulosa* (André); *Aglaostigma nivosum* (Klug); *Homoeoneura pinguis* (Klug); *Aglaostigma subalpinum* sp. n. (see below).



Figs. 3–5.—Face to show convergence of eyes and form of clypeus and labrum in *Aglaostigma aucupariae* (Klug) (fig. 3), *Rhogogaster viridis* (L.) (fig. 4) and *Elinora dominiquei* (Konow) (fig. 5).

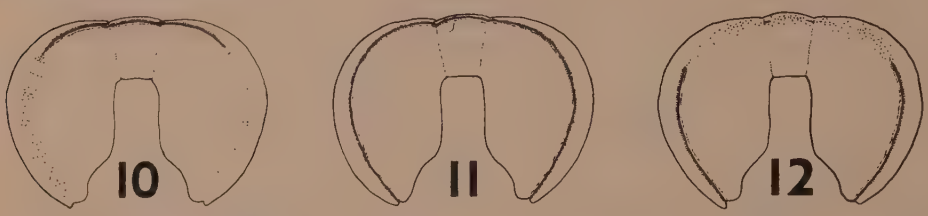
Figs. 6–9.—Clypeus and labrum in *Tenthredo atra* L. (fig. 6), *Perineura rubi* (Panzer) (fig. 7), *Sciapteryx costalis* (F.) (fig. 8) and *Macrophya annulata* (Geoffroy) (fig. 9).

Aglaostigma subalpinum sp. n.

♀ *Colour : Head* yellowish-white with the following parts black : mandible tips, base of clypeus, groove between clypeus and face, a large patch on the vertex and ocellar region extending down the frontal groove as far as the level of the antennal sockets and in the antennal grooves each side as far as the antennal sockets, and connected behind with

the entirely black hind surface of the head, reaching the eyes on the lower outer orbits. Antenna black above and yellowish white below on all the segments, including the two basal ones.

Thorax black with the following parts yellowish white: the hind and lower two-thirds of the pronotum, tegula, scutellum, and a V-shaped mark on the front inner margins of the side lobes of the mesonotum, upper two-thirds of the mesepisternum (except for the front margin), a stripe at the junction of the mesepisternum with the mesosternum. *Legs* with the coxae and trochanters white except for a black streak above and below and at the joints between the segments; rest of the legs reddish-yellow with the tarsi, especially on the hind legs infuscated. *Wings* hyaline; base of stigma, apex of costa and subcosta, and all venation at extreme base of wings, yellowish-white; rest of venation piceous. *Abdomen* mostly yellowish-white with tergites 3–5 orange in the middle; the following parts black: tergite 1 except at the sides, middle of 2, base of 3, 6, 7, and 8, sides of 9, also base of hypopygium and the valvifers.



Figs. 10–12.—View of head from behind to show development of occipital carina in *Aglaostigma* (fig. 10), *Tenthredo* (fig. 11), and *Sciapteryx* (fig. 12).

♂ differs from ♀ in that the whole of the head is yellowish-white, except only for a restricted vertical-ocellar patch, invading the frontal basin in front and extending backwards to cover the upper two-thirds of the surface behind the head; the whole of the mesepisternum and mesosternum are yellowish-white, so also are the coxae and trochanters (except for the joints between the segments); the rest of the legs are yellow with a black line on the fore femur above, on the middle femur and tibia above and on the segments of the hind legs above. The abdomen is yellowish-white, slightly orange on the middle of tergites 2–6, with only the middle of tergites 1 and 2 and the extreme basal margins of all the tergites above lined with black.

Length: ♀ 6·5 mm.; ♂ 6 and 7 mm.

♂ and ♀. Structurally almost identical with *Aglaostigma fulvipes* (Scop.). Eyes subparallel in front and only slightly converging; the frontal area is, however, slightly deeper than in that species; the antenna is about as long as twice the breadth of the head (4 mm.: 2 mm.) as in that species; likewise the hind tarsus is approximately the same length as the hind tibia. Wing venation normal with two enclosed middle cells in the hindwing in both sexes. ♂ and ♀ genitalia not distinguished from those of *Aglaostigma fulvipes*.

Switzerland: Valais, 1 ♀ (Holotype) and 1 ♂ (Allotype), Les Haudères, 4000–5000 ft., 6–27.vi.1935, and 1 ♂ (Paratype), Ferpècles, 5000–7000 ft., 21–27.vi.1935 (*J. E. and R. B. Benson*).

This species is obviously very closely related to *Aglaostigma fulvipes* (Scop.) and might be only a race of that species, but it is very strikingly different from that species in colour with its conspicuous white scutellum and white marks on the mesonotum and much whiter head and abdomen. Were it not for its wing-venation it might be mistaken for a dwarf *A. nivosum* (Klug) and, were it not for the eyes, for a dark form of *A. lichtwardi* (Konow).

3. Tribe : **Sciapterygini** tr. n.

This tribe is concentrated in the Mediterranean and the Eurasian steppes; *Sciapteryx* in the Caucasus and S.W. Asia, though a few species reach the highlands of Tibet and two reach Western Europe, but it should be noted that the Tibetan *Sciapteryx gilva* Konow and *S. virescens* (Jakovlev) as well as the arctic European *S. arctica* (Kiaer) are now transferred to *Rhogogaster*; *Elinora* gen. n. (defined in the foregoing key) is centred in the West Mediterranean, N. Africa and Spain, though *E. dominiquei* spreads up the Atlantic coast as far as Britain and *E. flaveola* spreads from a S.E. European centre into Central Europe. It should be noted that the form in Britain has heretofore been regarded as *E. flaveola*, but it is clearly the western form *E. dominiquei*; at the same time it is reasonable to interpret these as western and eastern Mediterranean subspecies of one species.

The following species, so named in the British Museum, formerly included in *Tenthredo*, belong to *Elinora* gen. n. (Probably several other species occurring in the South Russian steppes, the Caucasus and other parts of the East Mediterranean really belong here but they have not been seen by me.)

Species of **Elinora** gen. n.

balteata (Kriechbaum.) (= *leucasii* Kirby) : Spain and N.W. Africa; *baetica* (Spinola) : Spain and N.W. Africa; *caspia* (André) (? = *nigritarsis* Konow) : S.E. Russia, Caucasus, Iran; *contigua* (Konow) : N.W. Africa; *dusmeti* (Konow) : Spain; *flaveola flaveola* (Gmelin) : Asia Minor to C. Europe; *flaveola dominiquei* (Konow) : Spain, France and Britain; *jugurtha* (Kirby) : N.W. Africa; *limbalis* (Spinola) : Spain; *maculata* (Kriechbaum.) : Syria; *obscurata* (Konow) : N.W. Africa; *ornata* (Enslin) : Caucasus; *pectoralis* (Kriechbaum.) : N.W. Africa; *rufonigra* (André) : N.W. Africa; *sabariensis* (Mocsary) : Asia Minor and S.E. Europe; *striatipes* (Konow) : N.W. Africa; ?*vilarrubiai* (Conde) : Spain.

4. Tribe : Tenthredinini.

This is far and away the largest tribe of the TENTHREDININAE, the genus *Tenthredo* being probably the largest genus in the sawflies. Furthermore to this tribe belong several Oriental and other genera not occurring in Europe, including in fact, I believe, all the Tenthredinine genera not mentioned above, and others yet to be split off from *Tenthredo*.

The genus *Rhogogaster*, as redefined above, includes the following European species :—*arctica* Kiaer; *chlorosoma* (Benson); *dryas* (Benson); *picta* (Klug); *punctulata* (Klug); *viridis* (L.).

5. Tribe : Macrophyini.

This tribe is most richly developed in E. Asia, where the great number of forms intermediate between the long-horned *Pachyprotasis* and the short-horned *Macrophya* make this twofold generic division untenable. The tribe is therefore now regarded as consisting of only one genus, *Macrophya*.

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Benson, R. B., 1938, On the Classification of Sawflies (Hymenoptera Symphyta). *Trans. R. ent. Soc. Lond.* **87** (15) : 353–384, 47 figs.

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Book Notice.

Systematics and the origin of species from the viewpoint of a Zoologist. By E. Mayr. Pp. xiv + 334, illust. 8vo. New York (Columbia University Press), 1942. Price $4.00.

This book is issued in the " Columbia Biological Series " and its author is a member of the staff of the American Museum of Natural History.

It is in 10 chapters entitled : methods and principles of systematics; taxonomic characters and their variation; phenomena of geographic variation; some aspects of geographic variation; the systematic categories and the new species concept; the holytypic species, in nature and in systematics; the species in evolution; nongeographic speciation; the biology of speciation; and the higher categories and evolution. There is a list of literature and an index.

The work is based on the Jesup lectures delivered in 1941, in which the author presented the evidence of the zoologist, and a botanist dealt with his own field. In it the author attempts a summary of knowledge in the field of systematics and subjects the principle concepts on which modern taxonomic work is based to a searching analysis. He also presents some of the evidence of the systematist on the question of the origin of species.

ONE RARE AND TWO NEW SPECIES OF ODONATA FROM TROPICAL AFRICA AND ASIA

By Lt.-Col. F. C. Fraser, I.M.S. Retd., F.R.E.S.

The reopening of communications with the liberated countries has resulted in an exchange of a flood of literature and, to a lesser degree, of material. I have been fortunate enough to share in both and am indebted to Dr. F. Carpentier of Liége University for a small collection of Odonata acquired from the Belgian Congo, N.E. India and Indo-China. This collection, which is made up of only thirty-two specimens, is important, however, in that it contains a new species belonging to the genus *Ischnura* and more particularly to the group *rufostigma* Selys; also there is a single specimen of the rare and aberrant *Chlorocnemis nigripes* Selys, the type of which was described from a subadult specimen with the colour and markings imperfectly developed: a full description of this is now given. I include here the description of a new *Lestes* from Siam, which is represented by a single female, unique, however, in possessing a quadrate pterostigma similar to that of *Platylestes*, although not belonging to that section of the family Lestidae.

Platycnemididae.

Chlorocnemis nigripes Selys (fig. 2, a, b, c, and d).

Male: Abdomen 37 mm. Hind-wing 22 mm.

Head: labium black with the extreme base cinereous, labrum glossy black: rest of head dull black, marked with pale azure blue as follows:—the genae and a narrow stripe continuous with them which runs across the frons but is interrupted at its middle where the two ends taper to a fine point, and a broad postocular spot on each side of occiput shaped like a stout capital letter L. Prothorax palest blue on dorsum, almost white, narrowly and sharply bordered by black on each side, whitish beneath. Thorax dull black on dorsum and as far laterad as the first lateral suture. A complete pale azure blue antehumeral stripe on each side of dorsum, broad below where its truncated end turns medially towards its fellow so as almost to enclose a broad oval spot of the ground colour: narrowing abruptly at about its middle and continued for its upper half as a very fine line. Laterally pale blue with a broad black complete stripe centred over the postero-lateral suture. Beneath creamy yellow, immaculate. Legs black, ventral surface of femora, coxae and trochanters pale yellow. Wings hyaline, *uncoloured*: pterostigma black framed finely in pale yellow just within the bordering veins, nearly quadrate but the distal side slightly shorter than the others; that of the hind-wing about one-fifth longer than broad, poorly braced or not at all; 16 postnodals in the fore-wings, 14 in the hind-wings, venation as in fig. 2, a. Abdomen black, segment 1 blue laterally, segment 2 with a small dorsal azure blue spot shaped like a shield, extending from the base of segment for about three-fourths of its length, segments 3 to 5 broadly blue on dorsum, the extreme apical and basal ends only narrowly ringed with black, sides and beneath black; segments 6 and 7 entirely black, segments 8, 9 and 10 broadly pale azure blue on dorsum, black laterally and beneath. Anal appendages: superiors blue on dorsum, black at apices and beneath, slightly longer than segment 10, conical as seen from above, tapering to apices, which are rather obtusely pointed and slightly curved inwards. Seen from the side, each appendage has its apex curled rather abruptly downwards and there is a robust ventral tooth-like spine springing from its broadened base.

Inferiors black, of about the same length as superiors, broad at base, then abruptly tapered, cylindrical, and directed obliquely rather sinuously upwards and backwards towards the apices of superiors.

Habitat: Central Africa: Belgian Congo, Faradje, 20.iii.30. (This locality appears to be situated at the head waters of the Congo.)

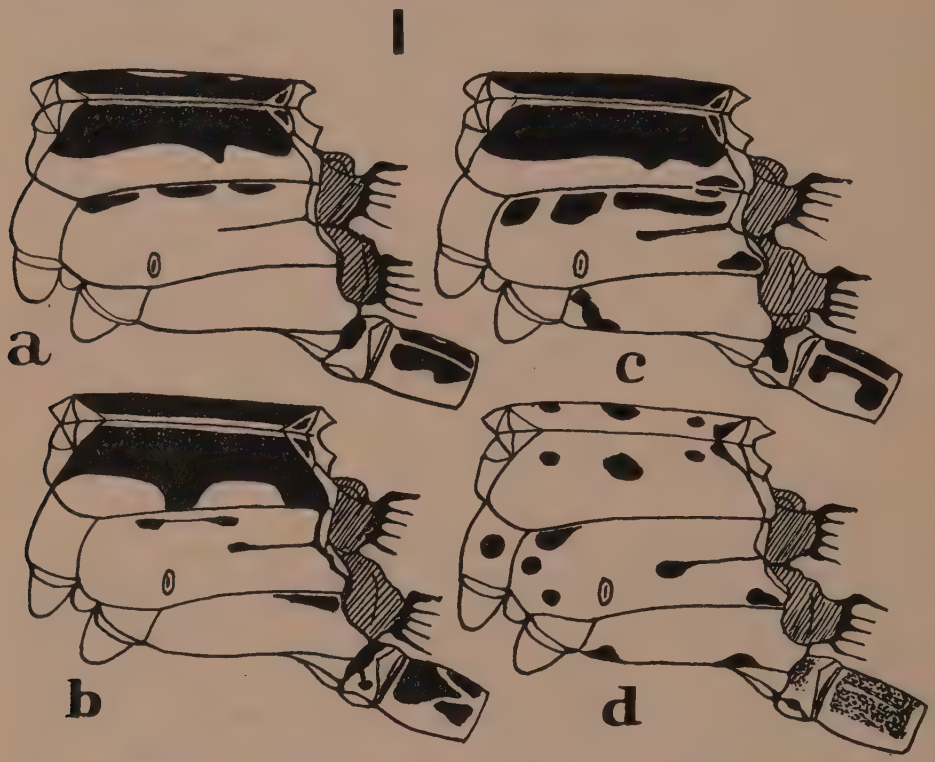

Fig. 1.—Thorax and first two abdominal segments to show markings of:—a. *Sympecma paedisca* Eversmann; b. *Indolestes indica* Fraser; c. *Indolestes anomala* sp. n.; d. *Platylestes platystyla* (Rambur).

Coenagriidae.

Ischnura carpentieri sp. n. (fig. 2, f and g).

Male. Abdomen 23 mm. Hind-wing 14 mm. (Female unknown.)

Head: labium pale yellow, labrum ochreous, its base broadly black, anteclypeus ochreous, postclypeus bronzed black, frons and genae pale ochreous, rest of head above dull black with small rounded pale blue postocular spots on each side of occiput: eyes brown. Prothorax black on dorsum and upper parts of sides, ochreous laterally: posterior lobe small, simple, rounded. Thorax black on dorsum and adjacent parts of sides covering the anterior half of mesepimeron, marked with a narrow, pale blue antehumeral stripe on each side of dorsum. Laterally pale blue changing to almost white beneath and with only vestigial evidence of stripes on the upper part of the sutures. Wings hyaline, very palely tinted with yellow; pterostigma of fore-wing very oblique, very acutely pointed distally and proximally, bright rust red proximally changing to golden yellow

distally, covering less than one cell. That of the hind-wing smaller, pale yellow framed in darker nervures; 8 postnodals to fore-wings, 7 in the hind-wings. Legs pale yellow, extensor surfaces of all femora black. Abdomen slim and cylindrical, slightly thickened at segments 7 to 10, bright tangerine orange in colour from segments 1 to 6, with fine black rings at the intersegmental joints. Segment 1 has a quadrate black spot on dorsum extending from base to apex, segment 2 has two small triangular black spots against the base which may or may not be finely confluent across the middle line, or there may be a vestige of a prolongation of this confluence along the middorsal carina. Segment 6 has the apical dorsal sixth black, segments 7, 9 and 10 and the sides of 8 are entirely black but *the whole dorsum of segment* 8 *is azure blue*. The lower parts of the sides of these latter segments as well as the whole ventral surface of abdomen ochreous. Segment 10 prolonged apically dorsally into a two-pronged tubercle. Anal appendages ochreous, the superiors dorsally and the inferiors at apices black: superiors very short subquadrate processes partially concealed as viewed from above by the overhanging apical border of segment 10. Inferiors about two-thirds the length of segment 10, broad and conical at base, directed straight back, tapering to an obtuse point: viewed from above they are somewhat compressed, hollowed out within and with apices curled rather abruptly inwards.

Habitat: Annam: Danggia, the packets containing these specimens, 27.x.20, 3 ♂. (Dr. F. Carpentier informs me that a capital "N" on these packets perhaps signifies "Mr. Nanta," who was the Director of the experimental station at Phu-Ho, Tonkin. As the date, 27.x.20, is similar to that borne on packets of specimens from Dalat, I infer that Danggia is possibly near Dalat but I am unable to trace it on any of my maps.)

This beautiful new species belongs to the group *rufostigma* Selys, in which all the males retain the primitive orange colouring of the female and, as such, are the most primitive in the genus *Ischnura*. *I. carpentieri* is most closely related to *I. mildredae* Fraser, from which it differs principally by the dorsum of segment 8 being wholly blue instead of bearing a small, almost obsolescent middorsal spot only of this colour. In *rufostigma* and *annandalei*, this segment is entirely black: a direct and continuous chain of evolution is thus found running from *rufostigma* through *annandalei* and *mildredae* to *carpentieri*. Almost throughout the genus *Ischnura*, andromorph and heteromorph females are found, the former resembling the males, the latter showing a reversion to the primitive orange colouring. These latter have been erroneously called *varieties* by most authors in the past, but the possibility of the same type of variety evolving in nearly one hundred per cent. of the species of a genus is beyond the bounds of credulity, and can only be explained by evolution from a common ancestor of more or less uniform orange colouring. *Type* deposited in the Brussels Museum.

Lestidae.

Indolestes anomala sp. n. (figs. 1, c, and 2, e).

Female. Abdomen 27 mm. Hind-wing 20 mm. (Male unknown.)

Head: labium cinereous, labrum, genae and anteclypeus ochreous, the latter with two small black points at its base; antennae dull yellow; rest of head dull dark metallic green save for two small triangular ochreous spaces on occiput, each surrounding a rounded obtuse tubercle. Prothorax ochreous with two small submetallic dark spots on the middle lobe: posterior lobe simple, broadly and evenly arched. Thorax ochreous, possibly bluish in the adult, marked dorsally by a broad median dull dark green metallic fascia with slightly sinuous borders and a short projection at about the junction of the upper

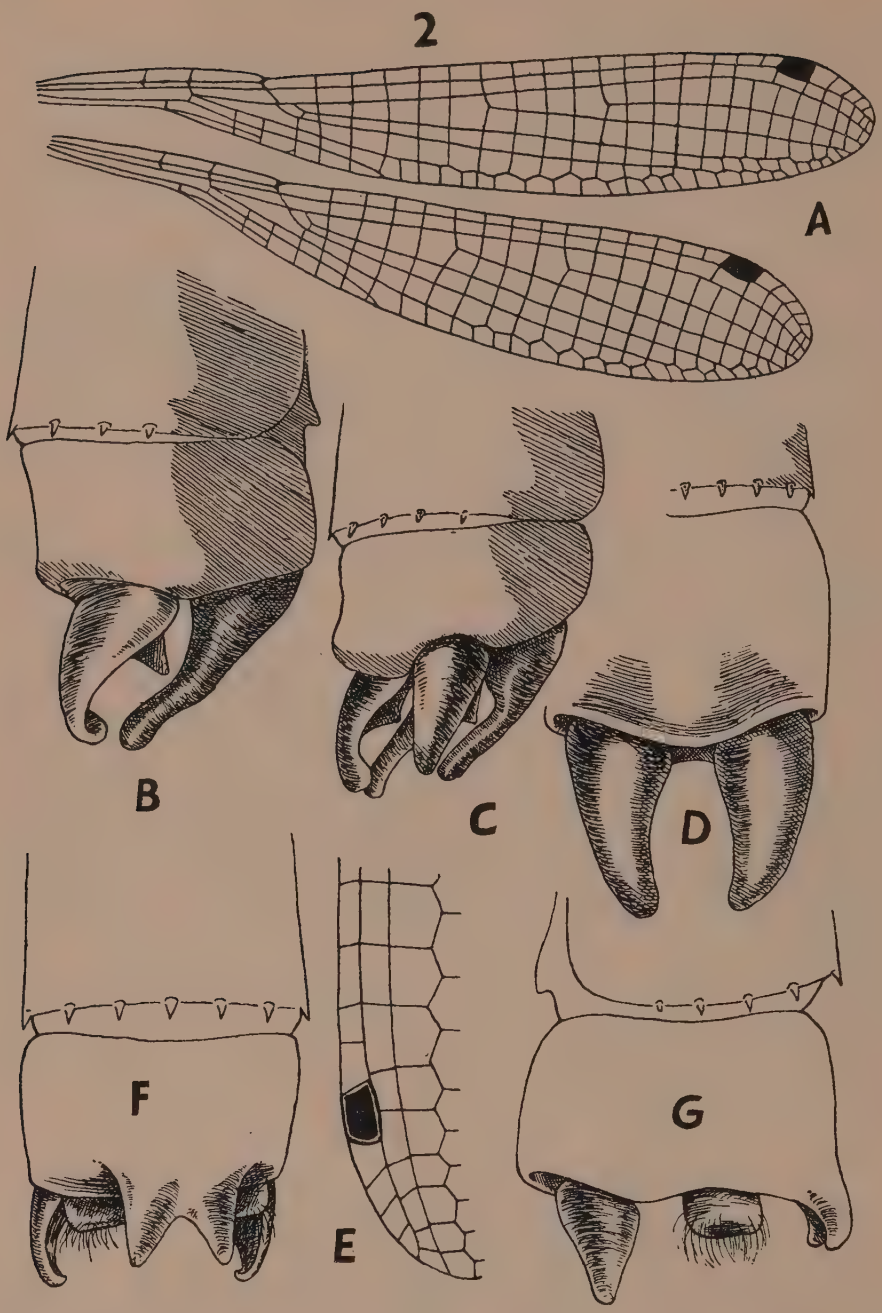

FIG. 2.—a. Wings of *Chlorocnemis nigripes* Selys; b, c and d. male anal appendages of the same species seen from the right side, right latero-ventral and dorsal aspects respectively; e. apex of wing of *Indolestes anomala* sp. n.; f and g. Tenth abdominal segment and anal appendages of *Ischnura carpentieri* sp. n., dorsal and left lateral aspects.

and middle thirds : this fascia finely bisected by the ochreous middorsal carina. Laterally 3 dark brown posthumeral spots of which the medial one is the best defined and somewhat rectangular in outline; the lateral sutures black above and a large black spot on the anterior part of the metepimeron, which is confluent across the pectus with the spot on the other side. Beneath pale, almost white, with two fine parallel dark lines on the middle of pectus, which are confluent anteriorly with the metepimeral spots, and diverge posteriorly to end in small oval blackish spots. Wings hyaline, palely tinted with yellow; pterostigma black framed in thick black nervures which are lined finely with pale yellow inwardly : that of fore-wing about one-third longer than deep, that of the hind-wing about half as long again as deep, the costal side distinctly shorter than the posterior one and the proximal side more oblique than the outer, so that the shape of the organ is decidedly irregular and quite contrary to what is the general rule in the family. Postnodals numbering 11 in all wings, discoidal cell of fore-wing shorter and broader than that of the hind-wing. In the fore-wing the base of this cell is about half the length of the costal side and only one-fifth of the posterior side. In the hind-wing the base is about one-third the length of the costal and only one-seventh of the posterior side ; petiolation extending from the level of *Ac*. Abdomen yellow or olivaceous but possibly bluish in the adult, marked with dark brown with a submetallic lustre (which may become fully dark green metallic in the adult stage); segment 1 with two elongated spots running divergently from the base but not extending as far as apical border of segment; segment 2 with a pair of broad middorsal stripes separated by the pale middorsal carina and expanding at basal and apical ends so that the pair together are shaped like a pair of grip-dumbbells; segments 3, 4 and 5 with a similar middorsal marking but elongated in accord with the lengths of the segments and not extending quite to the ends of the segments. Segments 6 and 7 with similar markings but dull non-metallic brown in colour and not extending as far as base of segments where they become diffuse and gradually fade out. Segments 8 to 10 dark brown with obscure indications of large yellow lateral spots. Anal appendages brownish, shortly conical (not depressed as in *Platylestes*).

Habitat : Siam : Doun-moi. A single rather teneral female, the *type*, in my own collection.

This new species might fit just as readily into either genus *Sympecma* or *Ceylonolestes*, but in the absence of the male, I have placed it for convenience into *Indolestes*, which is an annectent genus between the two former. The new species is easily determined from all others as it is the only one in this subfamily in which the pterostigma is quadrate in shape. *Platylestes platystyla* (Rambur), in which the pterostigma is of the same shape, belongs to the subfamily Lestinae in which the discoidal cells of the wings are of approximately the same shape and size.

LESTES SPATULA, A NEW SPECIES OF DRAGONFLY FROM THE ARGENTINE REPUBLIC (ODONATA)

By Lt.-Col. F. C. Fraser, I.M.S. Retd., F.R.E.S.

Among material sent to me from the Argentine Republic some years ago by Captain Kenneth Hayward is a single pair of Lestine dragonflies which I have been unable hitherto to determine owing to a lack of other South American species belonging to the same family with which to compare them. I have since seen examples of all of these and am now able to see that the present specimens belong to an entirely new species, belonging to the *forficula* group but differing from all of these by the structure of its superior anal appendages, a character which renders this new species readily determinable.

Lestes spatula sp. n.

Male. Abdomen 20 mm. Hind-wing 30 mm.

Head: labium pale brownish-yellow; labrum, clypeus and genae a dingy yellow (but probably *blue* during life) with three tiny brownish-black points on labrum, one of which is situated centrally; rest of head above dark brownish-black with small ill-defined areas bordering the lateral ocelli ochreous (in a teneral state, this dark area would be probably green metallic); beneath and behind head and eyes pale yellow but entirely overlain by a dense white pruinescence. Prothorax with dorsum dark bronzed black, ochreous laterally but this area overlain by dense white pruinosity including the anterior trochanters and coxae. Thorax dull ochreous with a narrow stripe on each side of dorsal carina metallic golden green, the middorsal carina broadly ochreous in between these stripes, which are pointed below and rounded above where they do not quite extend to the antealar sinus; a similar metallic-green posthumeral stripe situated slightly posterior to the humeral suture, and broadening perceptibly below where it tends to lose its metallic sheen. A third metallic stripe appears to border the metepimeron anteriorly but is largely obscured by an overlay of white pruinescence which coats the sides and beneath of thorax. The pectus almost pure white with pruinescence and *with no perceptible dark markings present*. Legs dull ochreous, outer surfaces of femora, flexor surfaces of tibiae and whole of tarsi blackish. Wings hyaline: pterostigma covering 2 cells, elongate, tapering slightly but distinctly distally, dark warm brown with the distal and costal sides finely bordered with pale ochreous; 10 to 12 postnodals in fore-wings, 9 to 10 in the hind-wings, venation otherwise that for *Lestes* sens. strict. Abdomen ochreous beneath and along the sides and with a medial black line running the full length on the ventral surface: dorsally dark metallic green becoming coppery metallic from segments 5 to 7, segments 1, the apical half of 8 and the whole of 9 and 10 pruinosed white. Anal appendages: superiors dark blackish-brown, half as long again as segment 10, straight for rather less than the basal half, then evenly curved inwards for the apical portion, each completing a quarter of a circle. About 5 moderately robust spines lining the outer border of appendages, as well as some long, evenly-spaced hairs. On the inner side, the appendages are hollowed out and present a thin but prominent ridge which, beginning in the outer part of the hollow, runs outwards and ends on the outer border near apex of appendage; on the inner border a robust prominent subbasal spine directed inwards and backwards at an angle of about 45

degrees to the long axis of appendage; a second much smaller and quite inconspicuous spine situated also on the inner border near the apex of appendage. Between these two spines, where normally would be a more or less broad shelf-like process, the border of the appendage runs with a slight even concavity, the inner and outer borders thus being parallel to one another. Inferior appendages dark brown, of the same length as superiors, broad and cone-shaped at base and marked dorsally by two thin ridges which converge posteriorly: then abruptly narrowed and with sides nearly parallel to as far as apex which is obtusely rounded and furnished with some long hairs. Above, this appendage is hollowed out into a gutter which gives to the whole appendage the shape of a cheese-scoop.

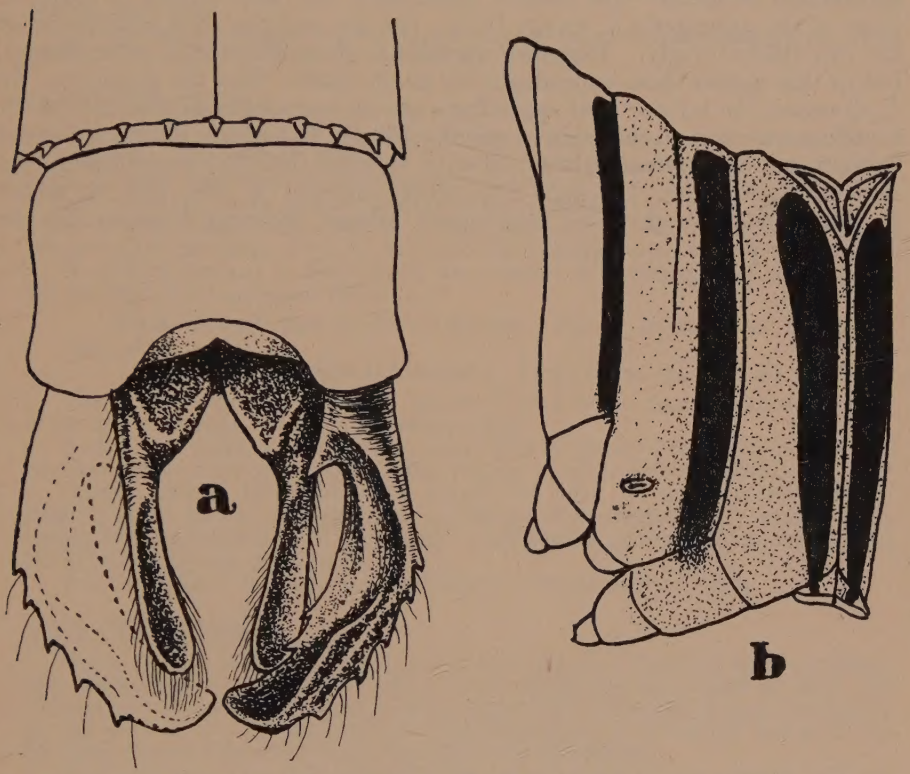

FIG. 1.—*a*. Dorsal view of anal appendages of *Lestes spatula* sp. n. *b*. Thorax of same showing markings.

Female. Abdomen 31 mm. Hind-wing 22·5 mm.

Similar to the male in colouring but the markings greatly reduced. Upper surface of head dull chocolate brown with a small irregular dark green metallic spot on each side of occiput and bordering the eye. Prothorax with only a small dark point situated on the middorsum of middle lobe. Thorax with the antehumeral stripes slightly narrower and dull coppery metallic in colour, whilst the posthumeral stripes are reduced to a mere vestigial streak confined to the lower part of the thorax; metepimeral stripe entirely absent. Pruinescence less dense than in the male although still marked on the lower parts of sides and underside of thorax. Wings evenly but very palely enfumed; pterostigma slightly longer than in the male, covering 2½ cells, dark brown framed throughout its whole circumference in pale ochreous; 11 postnodals in all wings. Abdomen coloured as

in the male but the metallic sheen becoming lost rapidly towards the posterior segments which are dark chocolate brown above, pale ochreous laterally and beneath; segments 9 and 10 pale dorsally and not pruinosed as in the male. Anal appendages and the underside of vulvar scales black, the former very shortly conical.

Habitat: A single very adult pair from ARGENTINE: Concordia, –.xii.35 (*Captain K. Hayward*). *Type* in my own collection.

This new species, by the equality in length of the inferior and superior appendages, belongs to group *forficula* Selys and is distinguished by the entire absence of the inner shelf-like projection normally found in the superior appendages of *Lestes*. The inferior appendages are very similar in shape to those of the palaearctic *L. sponsa* Hans., but the superior anal appendages of the two differ strongly. They also resemble in shape those of *L. vidua* Hagen, but in this species these appendages are much shorter than the superiors. In *L. spumaria* the inferior anal appendages are shorter and more slim, whilst the superiors are not at all curved in at apices. Finally *L. forficula* Rambur, *scalaris* Calvert, and *bipupillatus* Calvert, all have an inner shelf-like projection on the superior appendages, although but poorly marked in the last, to which species *spatula* appears to be most nearly related, differing, however, by the immaculate pectus.

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1946.

WEDNESDAY, May 1
„ June 5
„ October 2, 16
„ November 6, 20
„ December 4

1947.

WEDNESDAY, January 15 (ANNUAL MEETING)
„ February 5

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